Hurricane/Tropical Storm

This Action Plan applies to Hurricane / Tropical Storm events. In general, these events occur with reasonable lead times, and it is possible to take proactive measures, as outlined below. Response and recovery can be time consuming during such events, and they can involve loss of electrical power supply, damage of structures and equipment, disruptions of service, and injuries to utility personnel.

INITIATION AND NOTIFICATION

Initiation of the hurricane/ tropical storm plan will occur when the NWS has determined a "Hurricane Watch" is in effect. The general terminology they utilize is as follows, in order of increasing severity:

- **Advisory**: Dissemination of Hurricane and storm information to the public every six hours.
- **Special Advisory**: Dissemination of Information when there is significant change in storm-related weather conditions.
- **Tropical Disturbance**: A moving area of thunderstorms is in the tropics.
- **Tropical Depression**: When there is identification of an area of low pressure, rotary circulation of clouds and winds up to 38 mph.
- **Tropical Storm**: A storm characterized by counterclockwise circulation of clouds and winds 39-73 is brewing.
- **Hurricane Watch**: There is a threat of hurricane conditions within 24-36 hours.
- **Hurricane Warning**: Expectation that a hurricane will strike within 24 hours or less, with sustained winds of 74 mph or more and dangerously high water.

The Atlantic and Caribbean hurricane season runs from June 1 through November 30, with the Eastern Pacific hurricane season running from May 15 through November 30.

SPECIFIC ACTIVITIES

I. Assess the Problem

Stay in contact with you VDH-ODW Field Office and work with your Local Emergency Manager to monitor meteorological conditions and forecasts. During such events, the Local Emergency Manager shall be in constant contact with the Virginia Department of Emergency Management and National Weather Service (NWS), disseminate information to agencies via conference call, e-mail, and broadcast fax.

II. Isolate and Fix the Problem

In preparation for the hurricane, the follow these general steps, as per the US EPA's Water Security Division:

General:

1. Line up, schedule emergency operations, and clean-up crews.
2. Notify Local, State, and Federal Agencies (FEMA and others) of location and telephone numbers of the emergency operating center or command post for the utility. For public water systems, be sure to line up contacts to request emergency water supply, if necessary.
3. Notify media where to access information and press advisories.
4. Arrange for food and water for the crews.
5. Notify and set up clear lines of communication with local authorities, such as police and fire in case of an injury or other emergency.
6. Arrange with the local power utility to be prepared to disconnect power to the plant if evacuation is necessary or if power lines are down and to restore power as a primary customer.
7. Arrange with local companies to purchase materials and supplies and to borrow/lease heavy equipment needed to make repairs to the plant.
8. Arrange with local companies to have materials and chemicals delivered to the plant as soon as it is safe and units are repaired and ready for operation.

Grounds and Common Areas:

1. Check inventory of emergency repair equipment and supplies (i.e., sand and sand bags, hand shovels, power equipment, fuel, batteries, flashlights, portable radio, first aid kits, etc.). Resupply if possible.
2. Stock service vehicles with equipment and supplies.
3. Fuel all vehicles and emergency generators.
4. Move service vehicles to high ground (above expected flood crest).
5. Check all communications equipment and charge or replace batteries (i.e., two way radios, cell phones, walkie-talkies, pagers, etc.).
6. Sand bag critical areas.

7. Board up critical windows and doors to prevent wind damage.

8. Shut down exposed pipes at river crossing to prevent loss or contamination of potable water, if the pipes brake.

Administration and Laboratory Buildings:

1. Remove portable electrical equipment and small motors from the flood zone.

2. Remove all sensitive laboratory equipment from the flood zone, where possible.

3. Remove or store computers in a safe area.

4. Remove or store all-important records in a safe area.

5. Move vital records such as built drawings, wiring diagrams, etc. to the emergency operations center or command post.

6. Remove or store furnishings in a safe place, when practical.

7. Disconnect electrical power to the building, if evacuation is necessary.

Treatment Plant and Pumping Stations:

1. Fill empty tanks with water to prevent floating.

2. Disconnect power to all units in the flood zone. Have the power utility disconnect power to the entire plant, if ordered to evacuate the facility.

3. Remove or move chemicals to a safe area. If removing chemicals from an underground or aboveground tank, fill the tank with water to prevent floating.

4. Remove fuel from underground tanks to prevent contamination of the fuel and to protect the environment. If possible move above ground fuel storage tanks to a safe area (fuel will be need for emergency and plant vehicles until new supplies arrive). If it is not practical to move above ground fuel storage tanks, remove the fuel and fill tanks with water.

5. Remove electrical motors, where possible.

6. When it is not practical to remove large motors, wrap the motors in plastic and seal as tight as possible. This will not keep the motor from getting wet, but will protect the motor from silt, mud, and dirt getting into the windings. If necessary, wash Submerged Motors with clean water and dry, and in most cases restore to service.

7. Remove shop tools and electrical hand tools to the emergency operations center or command post.

8. As appropriate, try to have elevated drinking water storage at full capacity.

III. Monitoring

1. Utilize Emergency power to the extent necessary and available to maintain pressure within the distribution system.

2. If Systems flood or otherwise had bacterial quality compromised, make sure to disinfect the water system and maintaining chlorine residuals throughout the water system.

3. Where such flooding, loss of pressure, or other damage has occurred resulting in potential bacterial compromise, issue "Boil Water", "Do not Drink", or "Do not Use" orders and Press Releases as appropriate. If necessary, announce a "Boil Water" notice as soon as possible, and realize that it may be necessary to issue a "Boil Water" notice before you can reach the Health Department.

IV. Recovery and Return to Safety

In the aftermath of the hurricane, the follow these general steps, as per the US EPA's Water Security Division:

General:

1. For water utilities, the first priority should be restoring fire flow and pressure.

2. For wastewater utilities, the first priority should be to restore primary treatment and disinfection.

3. Line up and schedule emergency operations and clean-up crews

4. Arrange with the local power utility to repair and restore power to the plant as a primary customer. DO NOT turn on Power to buildings or process units until the floodwater recedes and the area is safe to occupy.

5. Notify Local, State, and Federal Agencies when the facility is back in operation.

6. The designated PIO is to notify the media where to access information and press advisories, such as boil water advisories and other public instructions.

7. Arrange with local companies to deliver materials and supplies and to provide heavy equipment needed to make repairs to the plant.

8. Arrange with local companies to deliver materials and chemicals as soon as it is safe, and facilities are prepared and ready for operation.

9. Contact State and local authorities to determine if there are any restrictions on disposal of materials and debris removed from the site or if a temporary discharge permit is needed for the water pumped from tanks and other flooded structures.

Grounds and Common Areas:

1. Inspect all service vehicles for water and wind damage.

2. Check site including remote locations for visible damage to power lines and above ground structures.

3. Inspect all sewage collection systems for damage and blockages. Most collection systems will require cleaning after a flood.

4. Inspect all exposed pipes, especially at river crossings, for leakage. Broken pipes can discharge raw sewage into rivers and streams. Broken water pipes including service connections to severely damaged structures can provide a source of contamination and/or pressure loss to the potable water system.

5. Check all remote control systems, including telemetering, telephone, and SCADA, etc.

Administration and Laboratory Buildings:

1. Check windows and doors for wind damage. Replace and repair as needed to prevent further damage and to provide security.

2. Check roofs for water and wind damage. Make repairs as needed to prevent further damage.

3. Pump out and remove silt, mud and sand from basements and other below grade areas.

4. Clean and disinfect masonry walls with bleach solution to prevent the growth of mold and mildew.

5. Remove all plasterboard, wallboard, and sheet rock that is wet or shows signs of water damage. Clean and disinfect all the interior studs and other support structures behind the damaged walls with bleach solution to prevent the growth of mold and mildew.

6. Inspect all switchgear, motor control centers, electrical boxes, junction boxes, and other electrical equipment in flooded areas for silt and sand or lose connections. Boxes should be cleaned and dried with portable or hand held dryers before the restoration of electrical power.

7. Thoroughly clean all wet carpets. It is advisable to remove carpets for cleaning. If removing the carpets is not practical, carpets should be steam cleaned, disinfected and mechanically dried. Treat carpets with an anti-bacterial agent to prevent the growth of mold and mildew if necessary.

8. Check and reset fire alarms, door alarms, clocks and other control and measurement devices.

9. Start sampling, monitoring and testing, including the water distribution system for coliform bacteria, as soon as the laboratory is operational.

Treatment Plant and Pumping Stations:

1. Pump out all tanks, wet wells, dry wells, channels, vaults and pits to remove silt, mud, sand, and debris. In some cases, washing down walls will be necessary before returning to service. Make sure you have all the necessary permits to dispose of the collected material and for discharging the wastewater.

2. Inspect all equipment, clean and lubricate.

3. Inspect all switchgear, motor control centers, electrical boxes, junction boxes, and other electrical connections in flooded areas for silt and sand or lose connections. Boxes should be flushed with fresh water and dried before the restoration of electrical power. Breaker boxes and other contacts may need additional cleaning to remove corrosion, especially if the damage from salty or brackish water occurs.

4. Inspect all electric motors. Generally, it is more cost-effective to replace small flood damaged motors than to try to repair them. In some cases, motors can be flushed with de-ionized water. Be sure the motor is thoroughly (oven dried) dry before restoring power. Starters and other electrical controls may have damage and will need replacing.

5. Inspect Plastic wrapped large motors for damage. Be sure the motor is thoroughly dry before restoring power. The recommendation is to have the motors cleaned and dried by motor or armature specialists. Starters and other electrical controls may also be damaged and need to be replaced.

6. Remove unwrapped large horsepower motors and send out for cleaning and drying. Check with the motor or armature specialists in your area. They often have equipment to clean and ovens to dry motors under controlled temperatures.

7. Inspect and clean debris from all air intakes and vents.

8. Calibrate and inspect all chemical storage and feed equipment to make sure that the equipment is undamaged.

9. Empty and restock Chemical and fuel tanks that contain water with fresh materials. Caution: Water from fuel tanks may still contain hydrocarbon residues and may require special handling and disposal.

10. Check and refuel emergency generators in the event of future power outages. If generators and diesel engines have been flooded, they will need to be overhauled or engines rebuilt. Getting emergency power capability resorted, should be a high priority. Consider renting portable generators or pumps if necessary.

V. **Report of Findings**

Assemble relevant personnel to review effectiveness of action plan and reinforce lessons learned.